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The Veterinary Record

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Clinical Observations on Dermatitis of the Horse caused by *Dermatophilus* sp.

BY

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SUMMARY.—Dermatitis of the horse caused by Dermatophilus *sp. is described with particular reference to the clinical aspects of the acute and chronic forms of the disease. The lesions are among those known by a variety of loosely applied terms, the use of which seems undesirable. Methods of diagnosis are discussed and tentative suggestions made for rational treatment of the disease.*

Introduction

THE purpose of this paper is to describe a dermatitis of the horse which although recognised for some time (Hornby, 1920; Bull, 1929; Stableforth, 1937; Hudson, 1937; Edgar & Keast, 1940), has not been mentioned in recent readily available publications. It is based on observations made on 10 natural cases and 48 experimentally induced lesions. The disease is due to actinomycetes belonging to the genus *Dermatophilus*, of which *D. dermatonomus* is the cause of mycotic dermatitis in sheep. The species isolated from the horse by Hudson was *D. congolensis*, but as yet those obtained in this country have not been identified. Mycotic dermatitis itself was described by Bekker (1928) in S. Africa, by Seddon (1928) in Australia, more thoroughly by Bull (1929), also in Australia, and occurs throughout the southern hemisphere. There it may result in disastrous losses to the wool crop and high mortality in lambs. Because of its importance in this species, there is a voluminous world literature on the subject (Ainsworth & Austwick, 1959). More recently it has been found to be widespread in this country (Austwick & Davies, 1958), causing losses by downgrading of affected wool and by occasional mortality.

Location and Incidence of Lesions

In the horse the dermatitis may vary from the acute to the chronic form and has been seen in practically all parts of the body except the lower parts of the chest and abdomen.

The acute form is dramatic and easily recognisable clinically. It produces lesions among those familiar to many veterinary surgeons as "rain scald." More is known about its incidence because the lesion is sufficiently startling to stimulate the submission of specimens for laboratory examination. Broadly speaking, in this country, it occurs following heavy rainfall in the area. Thus it is not seen in the absence of heavy rain, whereas last autumn and winter it was extremely common. This is, presumably, a measure of the unusual microclimate of the skin produced by the incessant wet weather.

The chronic lesions are not so well-defined, can also be confused with other skin diseases and with them masquerade under a variety of names. Such terms as "mud fever" and "heel-bug" are among those used, but there is no uniformity of application. Particularly is this so with the name "heel-bug," the only merit of which is to indicate the site of the lesion. In the opinion of some experienced clinicians this term should be reserved for an entirely different disease as yet of unknown origin which bears no resemblance clinically to the disease under discussion. Few specimens are submitted from cases showing the more chronic form of the disease which is much more common than hitherto recognised, and can be very troublesome, depending on the site of infection. It has been seen in the saddle area and the organism has been found in lesions at the back of the pastern. As one of the earliest signs of the disease in experimentally induced lesions is a loss of normal skin elasticity, this infection may be one of the contributing causes of cracked heels.

Signs of the Disease

The characteristics of the organism are such that, under normal management conditions, ubiquitous spread of infection seems almost inevitable. However, the incidence of visible disease in the animals at risk is apparently entirely determined by environmental

predisposing causes, such as exposure to rain and perhaps also the absence of other competitive organisms in the skin flora (Roberts, 1957). The occurrence of lesions then may be limited and give the erroneous impression that the disease is not contagious.

The acute form may be localised or widespread on the body. It is most common on the upper parts, the lesions sometimes having a surprisingly bilaterally symmetrical appearance. Unless the animal is under close observation, closer than that often maintained when it is "turned out," the lesions may progress before they are recognised until the whole of the area from the withers to the tail-head show patches of infection. The extent of this distribution may not be realised until the hand is run over the animal when tufts of hair matted together at their base are detected. This is illustrated in Fig. 1, prepared from a photograph of the flank of an in-foal mare on a carefully-managed stud in the Newmarket area. The sodden appearance of the coat is well shown but before palpation there was no indication of the extent and nature of the underlying lesions. These had a patchy distribution throughout the area shown and 3 were raised from the surface for the purpose of this illustration. Later stages of this form give rise to the "paint-brush" effect so aptly described by Hornby (1920). The lesions are not usually all at the same stage of progression. Thus an animal may be thought by the owner to have rubbed itself, perhaps because of a denuded area on top of the buttocks, whereas on more careful examination, lesions are found to be more widespread. The tufting effect with raising of the hairs out of their normal level is then often the first recognised sign of the disease. The scab formation is apparently caused by a disordered keratinisation of the stratum corneum, accompanied by inflammatory exudation and infiltration with leucocytes. The lesions are often roughly circular or elliptical in shape, perhaps 1 in. in diameter and ¼ in. thick, and may be confluent. The scab is grey and corrugated externally with the hairs protruding from it and peels from the underlying dermis, which is pink and moist, yet, surprisingly at this stage, shows little pruritus. The periphery is the last to separate. The concave inner surface of the scab consists of yellow, almost fluid pus. On drying, the pus tends to lose its yellow appearance and assumes more closely the greyish colour of the rest of the scab. Few hairs project beneath it and of those which do, some show abnormalities in hair growth—there being a tendency for abnormal colouration of the hair and a loss of the normal tessellated appearance of the hair root, which becomes smooth and club-like in appearance.

The most chronic type of the disease, perhaps the least troublesome but from the point of view of differential diagnosis the most confusing, takes the form of excessive "flaking" from the skin. In the subacute stage the adherence of these flakes to each other becomes greater, and the lifting effect on the hair becomes more marked. The normal elasticity of the skin is lost, the lesion being hard and plaque-like on palpation.

Laboratory Diagnosis

Thick preparations should be made on a slide preferably by crushing material from the inner surface of the scab, using some suitable diluent such as sterile distilled water. After air-drying and fixation with methyl alcohol for 30 seconds, the organism may be stained (Hudson) using 1 : 10 Giemsa for 30 minutes or, for routine use in a busy practice, 2 per cent. aqueous methylene blue for 20 secs. gives readable results practically immediately. The abundant branching filaments, dividing both transversely and longitudinally, are almost diagnostic of *Dermatophilus*. A characteristic filament is illustrated in Fig. 2 in which the field for the photomicrograph was chosen to show, in addition, the fibrin threads, keratin strands, invading polymorphonuclear leucocytes and disordered keratinisation of epithelial cells. Fragmentation into regular sarcina-like, tetrad and diplococcal groups, then into individual motile cocci eventually occurs. Preparations made from the inner surface of freshly collected scabs may reveal the organism in pure culture. It is hoped to discuss the cultural characteristics elsewhere.

Laboratory confirmation of the more chronic forms of the disease is more necessary for differential diagnosis. By comparison it is much more difficult, particularly if the examination is delayed. In these lesions, the organism occurs far less profusely and therefore may require a good deal more time for detection. The site of infection may also be contaminated with dried mud which makes the preparation of suitable slides difficult. Cultural examination is often unsatisfactory largely because of the high rate of contamination with more rapidly growing organisms, some of which inhibit growth of *Dermatophilus* (Roberts, 1957, and personal observations), and a selective technique is needed, particularly for specimens submitted by post.

Cultures on readily available routine bacteriological media, have on occasion revealed that lesions resembling this disease have in fact been associated with a coagulase-positive staphylococcus or a β haemolytic streptococcus infection. Laboratory diagnosis will help to remove the imprecision about the causes of dermatitis in the horse.

Treatment

The treatments which can be unhesitatingly recommended have yet to be determined by controlled therapeutic trials. Chronic and subacute infections have been produced experimentally. If more acute lesions identical to those occurring naturally can be produced, these will serve admirably for further investigation. At the moment, it is felt that the results of *in vitro* sensitivity tests may give some lead to therapeutic measures which may be adopted. As seen in Fig. 3, which shows 2 strains of the organism cultured for 24 hours at 37°C. on horse blood agar plates to which Difco sensitivity discs have been applied, the organism is sensitive *in vitro* to penicillin, chlortetracycline,* oxytetracycline,† chloramphenicol‡, and dihydrostreptomycin.

* Aureomycin. † Terramycin. ‡ Chloromycetin.

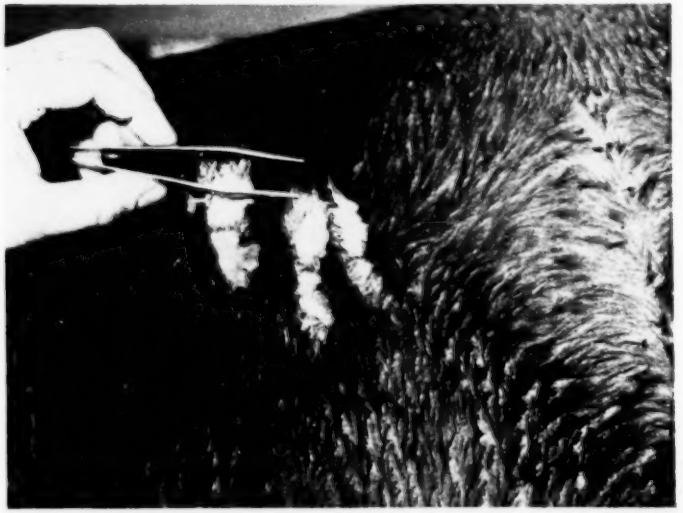

FIG. 1.—Acute *Dermatophilus* infection. Three of the multiple lesions lifted by 4-in. dressing forceps.

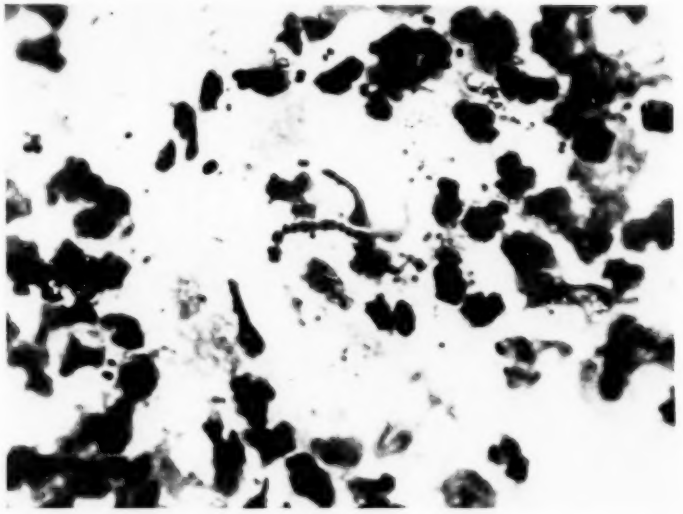

FIG. 2.—Preparation from scab, showing the diagnostic stage of *Dermatophilus*. Giemsa × 450.

FIG. 3.—*Dermatophilus* cultured for 24 hours at 37° C. on horse blood agar. Penicillin, dihydrostreptomycin, aureomycin, terramycin and chloromycetin Difco sensitivity discs were applied, reading clockwise from above.

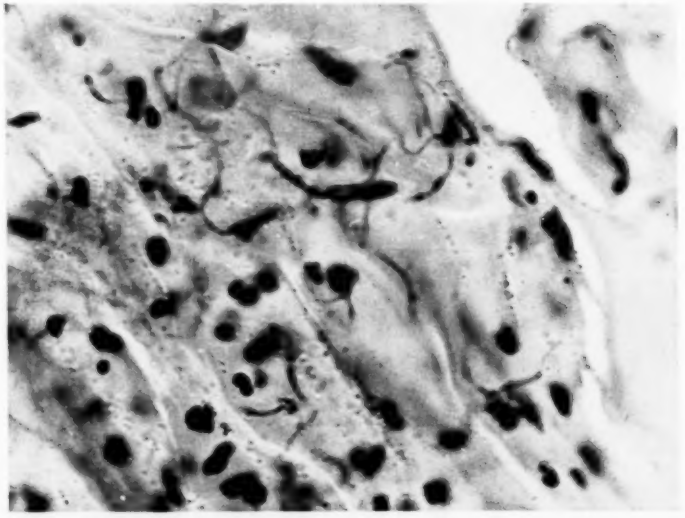

FIG. 4.—Section of a scab showing *Dermatophilus* infiltrating irregularly keratinised epithelial cells. H./E. × 450.

A somewhat less precise modification of this technique has also been applied in *in vitro* tests with various other drugs. The method lacks finesse in adequate dose estimation, but in that respect it shares a common fault with most topical applications used for therapy. It may be that in this disease as in other skin infections (McPherson, 1957 and 1959), *in vitro* sensitivity cannot necessarily be taken to indicate the likely *in vivo* activity of a particular substance. This could well be understood when the ramification of the organism throughout even the densest scab is seen. This is shown in Fig. 4, a photomicrograph of a section stained with haemotoxylin and eosin. However, there are reports from the field which, while as yet necessarily uncontrolled, indicate that formulations which are active in laboratory tests give good clinical response.

The results of adequate therapeutic trials in which *in vitro* activity can be compared with *in vivo* response must be awaited, but until these are available present opinions are as follows. Although some clinicians have used oily dressings in the treatment of this disease, it is felt that the application of drugs in this form, or as ointments, is undesirable. So often these applications merely result in the matting of hairs in the vicinity of the lesion, which prevents the active principle reaching the desired site, and merely hides the area from adequate visual examination. This being so, the use of, for example, chloramphenicol in the aerosol form (the tinted preparation indicating where dressing has been adequate, but perhaps raising objections from some owners), or 1 per cent. gentian violet in methylated spirit seems preferable. Iodine (in the form of liquor iodi fort for use in insensitive areas in the coarser type of animal, and liquor iodi mitis for somewhat more sensitive areas) and various proprietary skin dressings show activity *in vitro* but there are drawbacks to the use of some of them *in vivo*. The time-honoured "lotion for fissured heels" (Hoare, 1933) and that pharmaceutical anomaly "white lotion" (*loc. cit*), also show some activity *in vitro*. Even mild irritants should not be applied to the more active lesions, because the animal may be driven so frantic that it becomes dangerous to keep it in the loose-box. For cases with widespread lesions, it has been suggested that effective systemic therapy is desirable, but so far there is no information available on such a method of treatment.

In addition to these applications the practice of general measures to limit the spread of infection seem desirable. Thus removal of tufts of hair with their attached scabs is indicated, providing these are in process of desquamation. If removed earlier, damage to the deeper layers of the skin may result in later disfiguration. The infected material should be destroyed. If possible, the horse should be housed, particularly during bad weather, to prevent further maceration of skin, otherwise the disease may flare up. Scabs remaining on a naturally infected animal have been found infected for over 3 months, and experimentally, local immunity does not seem to occur following recovery from previous infection.

Acknowledgments.—I would like to thank particularly Mr. G. A. Pepin, of the Central Veterinary Laboratory, Ministry of Agriculture, Fisheries and Food at Weybridge, for his admirable advice and for providing material; his colleague, Mr. P. K. C. Austwick, for reading this paper and making valuable suggestions; the veterinary surgeons in this area, Mr. F. T. Day and Mr. R. C. Crowhurst, who have made cases available for observation; my colleagues at the Equine Research Station, particularly Mr. E. J. Roberts, for providing clinical material and for taking the photograph shown in Plate 1, Dr. R. K. Archer for taking those from which Plates 2, 3 and 4 were prepared, and Mr. Wm. C. Miller, our Director, for his encouragement, and the librarians of the Royal College of Veterinary Surgeons and the Veterinary School, Cambridge, who helped by providing the less readily available publications.

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A HELPFUL PUBLICATION

Since the Second World War the use of proprietary preparations has become general in both medical and veterinary practice. The drug manufacturers market their products under trade names which sometimes disguise the nature of the preparation. In the medical world there are several authoritative publications to guide the physician in his choice of proprietaries, but in this country there has been no similar assistance available to the veterinary surgeon, although the veterinarian in North America has had the benefit of the Veterinary Drug Encyclopaedia for several years.

A new handbook (Index of Proprietary Veterinary Preparations, edited by Major Hamilton Kirk, Nivek Publications Ltd., 5s.) is a welcome addition to the clinician's equipment. It lists proprietary preparations, their indications, the methods of administration and the manufacturers. The preparations are classified on a pharmacological basis though a simple alphabetical index might be preferable. One would like further details of the preparations and their dosage, but this would obviously increase the size of the publication and therefore its price. The index is issued free to subscribers to the "Vetinfile."

Factors Influencing the Properties of Boar Semen

BY

PETER RADFORD

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SUMMARY.—Nine Large White boars were trained to mount a dummy sow and were collected from at intervals ranging from 1 to 11 days.

Both the artificial vagina described by Polge (1956) and that designed by Aamdal, Hogset, Sveberg and Koppang (1958) were used to collect semen.

The influence of the age of the boar, interval between collections, and the design of artificial vagina on sperm density, semen volume and total sperm ejaculated were measured.

Sperm density was correlated with the intervals between collections when the artificial vagina described by Polge (1956) was used to collect from mature boars. On the other hand there was no correlation when immature boars were collected from with this apparatus or where mature boars were collected from with the artificial vagina described by Aamdal et al. (1958).

There was no correlation between gel-free semen volume and interval between collections.

Interval between collections was correlated with total sperm ejaculated when mature boars were collected from with both types of artificial vagina. No such correlation existed for immature boars.

The significance of the results in terms of total sows inseminated annually with semen from one boar were discussed.

INTEREST in properties of the ejaculate of the boar was stimulated by the work of McKenzie, Miller and Bauguess (1938), but with the exception of Wallace (1948) little interest was displayed in these aspects of the reproductive physiology of the boar until Aamdal and Hogset (1957), Niwa (1958), Turkheimer, Young and Foote (1958), Lagerlof and Carlquist (1958), Hancock (1959), and Karg and Leidl (1959) published the results of their findings.

To determine the minimum collection interval which resulted in ejaculates of satisfactory volume and sperm density, boars in the artificial insemination stud at the Langford Branch of the Somerset Cattle Breeding Centre were collected from at various intervals. It was considered essential to know how frequently a boar, particularly of good breeding quality, could be used to ensure that the maximum number of sows could be inseminated and that his influence could be spread as widely as possible.

It was also considered important to know how the method of semen collection affected semen volume, sperm density and total semen ejaculated, as well as its influence on the farrowing rate of artificially inseminated females.

Materials and Method

Nine Large White boars of various ages were used for the experiment. All were trained to mount a padded metal framework which served as a dummy sow. Contrary to some reports, considerable difficulty was encountered in training 2 of the boars to mount the framework, but when they had served once no further difficulty was encountered in making semen collections. Two collection methods were used, and in both the artificial vagina was warmed to 42°C. and semen was collected into an uninsulated polythene bottle. The 2 methods of collection were those described by Polge (1956) with slight modifications and by Aamdal, Hogset, Sveberg and Koppang (1958).

(a) *Semen Collection Method* 1

At the commencement of the experiment an artificial vagina similar to that described by Polge (1956), (the British artificial vagina) was used. Instead of emptying the water out before use, 2 liners were inserted in the casing, with water at 42°C. between. The pulsating pump was attached by the plug to the air space between the outer liner and the casing and pulsations were continued during semen collection. It was found, however, that pulsations were not necessary and that a single liner tightly inflated provided sufficient stimulus to induce the boar to ejaculate. The pulsation pump was, therefore, dispensed with and a Clarke's tap used instead. Both with and without pulsations, some boars took a long time to settle and produced a large amount of accessory secretion before the sperm-rich fraction was ejaculated. Another difficulty which was quite often encountered was loss of semen from the end of the artificial vagina nearest to the boar because a plug of gel formed near the funnel and prevented semen flowing into the bottle.

(b) *Semen Collection Method* 2

Following discussions with Norwegian workers in the field, a new collection technique was adopted, and the artificial vagina described by Aamdal *et al.* (1958), (the Norwegian artificial vagina), was used.

When the boar mounted the dummy, the penis was manipulated through the opening in the foam rubber and when the penis was thrust right through the vagina into the funnel the collector tried to grasp the spiral tip of the penis and hold it tightly. The boar usually moved the penis back and forth several times before the operator succeeded in gripping it. As soon as the penis was fixed in the hand, ejaculation commenced and the bottle was detached from the splint and allowed to hang down so that semen flowed directly into it.

At the end of ejaculation the boar usually began to thrust again, whereupon the penis was released

and the boar allowed to dismount. Two consecutive ejaculates were never collected.

The sperm density of semen was determined nephelometrically (Radford & Herdan, 1961).

(a) *Sperm Density of Whole Gel-Free Boar Semen*

The sperm density of gel-free semen ejaculated by mature and immature boars from which semen was collected at various intervals with 2 types of artificial vagina is shown in Table I. It was seen that, in semen from mature Large White boars collected with the British artificial vagina, there was a systematic increase in density as the collection interval increased from 1-to-3, to 5 days. After a marked fall at the 6th day interval there was a further systematic increase up to the 11+ day interval.

TABLE I
THE SPERM DENSITY OF GEL-FREE SEMEN EJACULATED BY MATURE AND IMMATURE BOARS COLLECTED FROM AT VARIOUS INTERVALS WITH TWO TYPES OF ARTIFICIAL VAGINA

Interval (days)	British artificial vagina				Norwegian artificial vagina	
	Mature boars		Immature boars		Mature boars	
	Total Collections	Average sperm density (millions per ml.)	Total Collections	Average sperm density (millions per ml.)	Total Collections	Average sperm density (millions per ml.)
1–3	69	267·2	9	263·8	10	369·0
4	29	291·0	15	299·3	17	335·2
5	21	327·6	14	301·1	22	376·0
6	25	297·6	13	336·1	27	321·7
7	32	295·3	13	349·9	14	347·0
8–10	20	311·9	15	352·4	24	388·9
11+	26	437·3	15	382·0	12	444·6
Total	222	307·5	94	329·5	126	364·1

The analysis of variance method was used for assessing the difference of the variation "between days" as against the variation "within days" of sperm density, semen volume and total sperm ejaculated. In this way it was found that the "between day" variation was significantly greater than the "within day" variation ($F=6.5^{**}$).

On the other hand, although it appeared from a visual examination of the data that a similar pattern existed for immature boars collected from with the British artificial vagina, the "between days" variation was significantly less than the "within days" variation ($F=1.23$).

Where semen was collected from mature Large White boars with the Norwegian artificial vagina there was neither visual nor statistical evidence of a correlation between sperm density and collection interval. The analysis of variance clearly showed that "within days" variation exceeded "between days" variation ($F=1.59$).

(b) *Gel-Free Semen Volume*

Table II shows the volume of gel-free semen ejaculated by mature and immature Large White boars collected from at various intervals with 2 types of artificial vagina. In no case was there any evidence of a relationship between the interval of collection and semen volume. An analysis of variance showed that in all cases the "within day" variation exceeded the "between day" variation (F in all cases $=<1.0$).

TABLE II
THE VOLUME OF GEL-FREE SEMEN EJACULATED BY MATURE AND IMMATURE BOARS COLLECTED FROM AT VARIOUS INTERVALS WITH TWO TYPES OF ARTIFICIAL VAGINA

Interval (days)	British artificial vagina				Norwegian artificial vagina	
	Mature boars		Immature boars		Mature boars	
	Total Collections	Average semen volume (mls)	Total Collections	Average semen volume (mls)	Total Collections	Average semen volume (mls)
1–3	32	248·3	—	—	8	144·4
4	16	211·9	6	122·0	14	171·4
5	13	215·0	9	92·0	18	171·1
6	11	191·6	11	108·0	27	174·4
7	20	195·6	12	116·0	12	184·2
8–10	15	222·0	11	95·0	22	173·4
11+	16	197·5	13	106·1	9	178·3
Total	123	209·6	62	105·9	110	172·5

TABLE III
THE TOTAL SPERM EJACULATED BY MATURE AND IMMATURE BOARS COLLECTED FROM AT VARIOUS INTERVALS WITH TWO TYPES OF ARTIFICIAL VAGINA

Interval (days)	British artificial vagina				Norwegian artificial vagina	
	Mature boars		Immature boars		Mature boars	
	Total collections	Total sperm (millions)	Total collections	Total sperm (millions)	Total collections	Total sperm (millions)
1–3	32	51,795	—	—	8	47,521
4	16	60,066	6	39,079	14	45,642
5	13	67,317	9	29,206	18	54,834
6	11	44,569	11	35,613	27	55,082
7	20	58,134	12	37,475	12	59,522
8–10	15	69,338	11	32,534	22	67,318
11+	16	78,732	13	37,972	9	75,888
Total	120	60,571	62	35,396	110	57,924

(c) *Total Sperm Ejaculated*

Table III shows the total sperm ejaculated by mature and immature Large White boars collected from at various intervals with 2 types of artificial vagina. It was seen that, where the British artificial vagina was used to collect semen from mature Large White boars, there appeared to be a systematic increase in total sperm from the 1-to-3 day, to the 5-day interval. After a fall at the 6-day interval there was a further systematic increase up to the 11 + day interval. The analysis of variance showed that the "between day" variation was significantly greater than the "within day" variation ($F=5.30^{**}$), as was also the case for mature boars collected from with the Norwegian artificial vagina ($F=2.57^{*}$).

On the other hand, when the British artificial vagina was used to collect from immature boars, the

"within day" variation exceeded the "between day" variation ($F = < 1.0$).

Discussion

Most workers recommended that boars should not be collected from more than once every 48 hours. McKenzie *et al.* (1938) claimed that to collect from boars more frequently than every second day led to a decrease in sperm density although the volume of the ejaculate remained constant. There was, consequently, a fall in the total number of sperm ejaculated. Wallace (1948) stated that irrespective of the interval between collections, variations in sperm density were due to independent fluctuations in sperm output and the volume of plasma ejaculated. Whereas, most workers were careful to collect only 1 ejaculate at each collection, Wallace said that all boars were allowed to continue ejaculations until they dismounted and that no attempt was made to separate ejaculates. Here, therefore, results have to be interpreted with caution and are not directly comparable with those of workers who generally collected only one ejaculate at a time.

Niwa (1958) claimed that there was a difference between boars in the frequency with which ejaculation was tolerated, but he recommended that, generally, a collection could be made every other day. More frequent use led to less dense semen and adversely affected sperm motility and longevity with a rise in the percentage of abnormal sperms. Aamdal *et al.* (1957), agreed with Niwa's findings but said that reduction in sperm density and volume as well as a weakening of motility occurred when collections were made more frequently than twice weekly.

Because of the large number of sperms apparently needed to achieve pregnancy (about 5×10^9 sperms), and thus, the comparatively few sows which can be inseminated from each ejaculate, it is essential that boars are collected from as frequently as possible without reducing the total number of sperms ejaculated and deleteriously affecting sperm motility and longevity. Accordingly, boars over 2 years old standing at the Langford Artificial Insemination Centre were collected from at intervals ranging from 1 day to over 11 days, and boars under 18 months old at intervals ranging from 4 days to over 11 days.,

It was found that the interval of collection had no significant effect on the density of semen collected from boars over 2 years old with Aamdal's artificial vagina; similarly, interval had no significant effect on density of semen collected from boars under 18 months old with Polge's artificial vagina. There was, however, a significant difference in the density of semen collected from boars over 2 years old with Polge's artificial vagina. Only in this last group was there a systematic increase in sperm density as collection interval increased.

In none of the 3 groups of boars did volume vary significantly with interval of collection. There were, however, significant differences in the total number of sperms ejaculated by mature boars when either method of collection was used, and a systematic increase correlated with lengthening collection interval was observed. Nevertheless, the total number of sperms ejaculated by young boars did not differ significantly when the collection interval ranged from 4 to over 11 days. It was considered inadvisable to work boars under 18 months of age more frequently than every fourth day.

Thus, mature boars collected from twice or thrice weekly gave sufficient semen to provide 10 to 15 doses each containing 5×10^9 sperms, or sufficient doses to inseminate 1,000 to 1,500 pigs annually. Immature boars, on the other hand, collected from at 4-day intervals ejaculated sufficient sperm to provide 6 or 7 doses each containing 5×10^9 sperms, or sufficient doses to inseminate 550 to 650 pigs annually, *i.e.* about half the number which a mature boar could cover.

Acknowledgments.—The work was made possible through the generous co-operation of Horlicks Farms and Dairies Ltd., Somerset Cattle Breeding Centre. Mr. J. Stower the veterinary surgeon in charge of the Langford Branch gave much practical help. Mr. R. Eglon was responsible for making many of the collections and Mrs. B. Newton and Mr. R. Ivens for recording the results Dr. G. Herdan gave invaluable help with the statistical evaluation of the results.

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PATHOLOGICAL SPECIMENS SENT BY POST

Through the courtesy of a reader we have received a list of companies who supply containers for pathological specimens to be sent by post. In the hope that they may be of use, the addresses are as follows: Messrs. R. B. Turner and Co., Inocula House, Church Lane, East Finchley, London, N.2. Ampoule tubes are supplied by Textile Paper Tubes Ltd., Oakwood Mill, Romiley, Stockport, Cheshire, and an outer envelope (the "Parcelope—Safe Transit Envelope") bearing the printed heading "Pathological Specimen — Fragile — Handle with care" is supplied by Messrs. Thomas Arnett and Co., Warner House, Warner Street, London, E.C.1.

Relationship Between the Level of Milk Production and the Fertility of Dairy Cows at Grass*

BY

H. S. McTAGGART

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SUMMARY.—Evidence is presented which suggests that the fertility of dairy cows may be impaired when they maintain, for more than a transitory period, a level of milk production in excess of that provided for by the production ration. It was calculated that, in the herd studied, high-yielding Ayrshire cows were incapable of ingesting a sufficient quantity of herbage to satisfy their production needs when they were kept under a semi-intensive system of grazing good summer pasture. Although phosphorus is commonly considered to be an important factor in the maintenance of optimum fertility, the starch equivalent of good summer grazing is just as inadequate for high-yielding cows as is its phosphorus content and evidence is cited indicating that this may have been a contributory factor, if not the primary one, in causing lowered fertility in the form of

1. *an increase in the number of services for conception,*
2. *abnormally long intervals between repeat services,*
3. *abortion.*

On the other hand, the incidence of undue delay in the onset of oestrus after parturition did not appear to be related to the adequacy or otherwise of the diet.

It is suggested that adequate supplementary feeding, in terms of both starch equivalent and phosphorus, during the grazing period might have resulted in improved fertility of the higher-yielding cows and an increase in milk yield of the others.

Introduction

IN 1932 Webster pointed out that, although there was some published evidence in support of the popular belief that high-yielding cows are those most subject to reproductive disturbance, other workers had been unable to find such evidence. Despite much work on the subject in the intervening years the situation remains virtually unchanged to-day. The lack of agreement between the results of these various investigations may be partly due to differences in the criteria used to measure fertility on the one hand and milk production on the other. A more important factor, however, may be the failure of almost all workers to take into account the adequacy or otherwise of the production ration of the animals under investigation. Where dairy cows are not fed strictly according to yield there is a tendency to overfeed the lower yielding cows and to underfeed the higher yielders. Under such circumstances a positive relationship could be expected between high milk yield and infertility whereas negative results might be obtained if all animals were fed according to yield.

The idea that fertility might be affected by inadequacy of the production ration was put forward as long ago as 1930 at the 11th International Veterinary Congress by Frei (1931), but little practical attention appears to have been paid to it until recently.

Snook (1958) described a situation in which such inadequacy of the production ration appeared to affect fertility and he indicated that this might be attributable specifically to deficiency of phosphorus. He found that, in Western Australia, good grazing, even when supplemented by cereal concentrates, could not provide high yielding dairy cows with enough phosphorus for both maximum production and regular reproduction. The cows reacted to the deficiency either by a fall in the milk yield or by lowered fertility. Although deficiencies severe enough to produce clinical aphosphorosis were uncommon, Snook found that subnormal levels of blood inorganic phosphorus (3.8 to 3.2 mg. per 100 ml.) often persisted throughout the winter.

A comparable situation was reported (McTaggart, 1959) following an investigation into the causes of an outbreak of "milk lameness" in a herd of Ayrshire cows in which it was calculated that the higher yielding cows could not acquire enough phosphorus from unsupplemented semi-intensive grazing of good summer pasture to meet their production needs. If the milk yield of such animals did not decline sufficiently rapidly and sufficiently far, the body reserves of phosphorus became depleted, culminating in a characteristic hip lameness associated with abnormally low blood inorganic phosphorus levels (3.8 to 2.8 mg. per 100 ml.).

In view of Snook's findings, the present study was undertaken to ascertain whether any disturbance of fertility had occurred in association with the outbreak of milk lameness.

Materials and Methods

Animals

Eight typical cases of milk lameness occurred in the herd in late September and early October, 1958. These cows had all calved before the end of July, 1958 and were still in milk on October 11th when treatment of the whole herd with a bone-flour supplement was commenced. A total of 35 animals, affected and unaffected, were in milk throughout the period August 1st to October 11th and, with one exception, these form the basis of the present study.

* An abridged version of this paper was read at a meeting of the Scottish Metropolitan Division of the British Veterinary Association in Edinburgh on February 8th, 1961.

Cow 54, specifically mentioned in connexion with milk lameness (McTaggart, 1959) is omitted from the present study because, although she came in oestrus regularly, she was purposely kept unserved and was eventually disposed of without her fertility being ascertained. All animals were served naturally except No. 17 which was artificially inseminated.

Nutrition

In 1958 the herd was first regularly turned out to grass by day in mid-April, being housed at night until early May. From then onwards the cows were kept on strip grazing of young leys by night and extensive grazing of older pasture by day. From early May till mid-June the higher-yielding cows received 4 lb. of concentrates ("grazing nuts") per head per day, while the lower-yielding cows subsisted on grass alone. Because of the abundance of lush grass during the unusually wet summer of 1958, concentrates were withheld entirely from mid-June till early September. Thereafter the higher-yielding cows again received 4 lb. of concentrates per head per day.

This level of supplementary feeding is sufficient for the production of approximately one gallon of milk but it is considered that, in addition to grazing, this would not be adequate for the high level of production of the cows receiving the supplement. This applies to the early part of the grazing season when milk production and the quality of the herbage were both at their best, as well as to the later part of the grazing season when both had declined considerably. In the latter case, for example, grazing would be adequate for maintenance and the production of about one gallon of milk (Woodman, 1954) while the supplement would provide for a second gallon of milk; but the cows which developed milk lameness were at that time all giving at least 3½ gallons of milk per day. It is considered, therefore, that the supplementary feeding does not invalidate the arguments which follow later regarding the inadequacy of the diet during the grazing season.

Milk Production

It has come to be accepted as "natural" for a dairy cow to be in negative phosphorus balance at the peak of lactation (Abrams, 1952). In the present study, those cows in which the peak of lactation occurred while they were grazing day and night would have greater demands for phosphorus during that grazing period than those cows which had already passed the peak; but the latter would have entered the grazing period with their phosphorus reserves already somewhat reduced. In order to make allowance for these factors the milk yield of each animal was calculated in terms of the average daily yield from the commencement of her lactation up to October 11th.

Fertility

The following data were ascertained for each cow:

1. Date of last calving prior to July 31st, 1958.
2. Subsequent service dates.
3. Date of next subsequent calving.

From these were derived:

1. Interval between calving and first service.
2. Number of services.
3. Intervals between repeat services.
4. Calving interval.

These data revealed 4 types of infertility recognised by the criteria detailed below, these being essentially concerned with the practical question of whether or not a significant lengthening of the calving interval was involved.

A. *Post-partum suboestrus or anoestrus.* Ideally a cow should calve once every 12 months. Taking the average gestation period of an Ayrshire cow as 278 days (Roberts, 1956), the interval between calving and successful service would then require to be no more than 87 days. However, a margin of a further 21 days (one oestrus cycle) was allowed and any animal which did not show overt signs of oestrus, and thereby did not present the opportunity for successful service, within 108 days of calving was regarded as exhibiting *post-partum* suboestrus or anoestrus. In the absence of any examination of the ovaries no distinction could be made between suboestrus (regular ovulation without overt signs of oestrus) and true anoestrus (without ovulation).

B. *Unsuccessful second service.* Since failure to conceive to first service is commonplace and not responsible *per se* for any serious lengthening of the calving interval, the failure of a second service was chosen as a more practical minimum requirement for a diagnosis of infertility.

C. *An interval of more than* 42 *days* (2 oestrus cycles) *between repeat services* was regarded as constituting an impairment of fertility, but in fact the chosen interval could have been anything from 24 to 49 days without affecting the results obtained. The reasons for the abnormally long intervals between services were not investigated.

D. *Abortion.* The abortion of cow 40 occurred after 3 months gestation. The aborted foetus and membranes were quite fresh and showed no macroscopic lesions. Bacteriological examination failed to reveal any organisms resembling *Brucella abortus* or *Vibrio fetus*; nor is any infectious form of abortion known to occur in the herd.

Table I shows the distribution of the various types of infertility and of milk lameness when the data are arranged with the cows in descending order of milk yield.

Post-partum suboestrus or anoestrus occurred at all levels of milk production. There was, however, an apparent inverse relationship between milk yield and the length of the interval between calving and first service in those cows in which the interval was regarded as being undesirably long. This was due to the fact that, in general, the longer the interval between calving and first service, the longer also was the duration of lactation and consequently the lower the average daily milk yield.

All other types of infertility and all cases of milk lameness occurred exclusively in those cows giving an average of more than 40 lb. of milk per day.

Discussion and Conclusions

Lactation Number

The average lactation number of those cows in

TABLE I
INCIDENCE OF VARIOUS TYPES OF INFERTILITY AND OF MILK LAMENESS IN COWS ARRANGED IN DESCENDING ORDER OF AVERAGE DAILY MILK YIELD CALCULATED FROM THE COMMENCEMENT OF LACTATION TO OCTOBER 11th, 1958

Cow No.	Mean daily milk yield lb.	Lactation No.	Duration of lactation to 11–10–58	Type of infertility				Milk lameness	Calving Interval
				A	B	C	D		
12	49·5	2	180	+ 121	+ 3	+ 42, 62	.	+	502
23A	48·6	6	162	+ 109	. 2	. 20	.	+	?
60	46·8	4	205	. 97	. 1	.	.	.	377
25	46·6	7	220	. 103	+ >3	+ 77, 101	.	.	?
32	46·4	4	176	. 107	+ 3	+ 44, 144	.	+	367
15	45·8	5	171	. 103	. 1	.	.	.	383
17	44·4	9	241	. 99	. 1	.	.	.	389
14	43·3	6	133	. 91	. 1	.	.	+	370
40	43·1	5	156	. 100	. 1	.	+	+	460
58	42·5	4	188	. 90	. 1	.	.	.	363
22	42·3	6	162	. 96	. 2	+ 50	.	+	376
10	42·1	6	161	. 96	+ 3	. 23, 19	.	.	426
33	41·6	4	77	. 76	. 1	.	.	+	352
55	41·3	4	220	+ 117	. 1	.	.	.	399
20	41·3	4	227	. 81	. 2	. 20	.	.	381
2	40·4	6	93	+ 131	. 1	.	.	+	?
51	40·0	3	186	. 96	. 1	.	.	.	385
53	39·6	2	190	. 91	. 1	.	.	.	369
46	38·6	5	181	. 80	. 1	.	.	.	358
18	38·5	3	208	. 103	. 1	.	.	.	385
29	37·9	5	184	. 81	. 1	.	.	.	359
41	37·3	7	231	+ 135	. 1	.	.	.	380
47	37·3	2	241	. 87	. 2	. 18	.	.	368
61	36·9	2	215	. 85	. 1	.	.	.	363
62	36·6	3	230	. 100	. 1	.	.	.	372
44	35·2	3	233	. 106	. 1	.	.	.	397
30	32·9	2	195	+ 151	. 1	.	.	.	416
37	32·5	6	225	. 84	. 2	. 24	.	.	393
19	31·9	2	150	. 92	. 1	.	.	.	370
13	31·7	2	231	+ 183	. 1	.	.	.	460
64	31·4	2	216	. 79	. 1	.	.	.	355
49	31·3	1	272	+ 252	. 1	.	.	.	532
42	28.3	1	287	. 92	. 1	.	.	.	372
67	24·0	1	371	+ 227	. 1	.	.	.	504

A = *Post-partum* suboestrus or anoestrus. Figures indicate interval in days between parturition and first service.
B = Second service unsuccessful. Figures indicate number of services for conception.
C = Interval of more than 42 days between repeat services. Figures indicate the duration of the intervals in days.
D = Abortion.
\+ = Affected animal.
A point indicates that the animal did not exhibit the condition as defined in the text.
? = Success of last service unknown, so that calving interval cannot be calculated.

Table I giving over 40 lb. of milk per day is 5.1 whereas in the case of those giving 40 lb. or less it is only 2.9. This might be considered to be responsible for the distribution of the different types of infertility but it seems more likely that the older cows were the ones which had been retained in the herd because they were good milkers and that their infertility was a function of their milk yield as discussed below. The younger cows would not have been so selected and in any case would not have reached their most productive lactations.

Post-partum Suboetrus or Anoestrus

The lowest-yielding cow of all (67) had calved over 6 months before regular grazing commenced in mid-April and showed no visible signs of oestrus until she had been 37 days at grass. She then conceived to the first service. This is typical of the "winter infertility" described by Laing (1950) and was obviously unrelated to the period of inadequately supplemented grazing. In the remaining cases the suppression of oestrus continued for too long within the grazing season, or the cows calved too late in the year, for their infertility to be regarded as being of this type. On the other hand, in 7 of them the period during which the suppression of oestrus persisted beyond 108 days occurred between May and September, which might suggest a connexion with adverse grazing conditions. But in 4 of these cases oestrus re-appeared in August when grazing conditions were probably poorest. This, together with its occurrence at all levels of milk production, suggests that the suppression of oestrus was not induced by inadequate nutrition during the grazing period.

Other Forms of Infertility

From figures given by Woodman (1954) it was calculated (McTaggart, 1959) that, under a semi-intensive grazing system such as that described above, a cow can acquire enough phosphorus from good grass for maintenance and the production of no more than about 40 lb. of milk per day. The exclusive occurrence of milk lameness and of infertility (other than that due to *post-partum* suboestrus or anoestrus) in cows giving more than this amount suggests the possibility that the clinical manifestations were attri-

butable to a phosphorus intake inadequate for the level of milk production. That this was true of milk lameness is supported by other evidence such as the incidence of hypophosphataemia in affected cows and their spectacular recovery following bone flour feeding (McTaggart, 1959).

With regard to infertility the findings are compatible with Snook's view that the relationship between infertility and milk yield is dependent on the adequacy or otherwise of the dietary phosphorus, apart from the fact that he did not specifically exclude *post-partum* suboestrus or anoestrus. At the same time there is an accumulation of evidence suggesting that an alternative or additional factor may have been involved.

According to Woodman (1954) the level of milk production supportable, over and above maintenance, by good quality grass is the same whether the calculation is made in terms of phosphorus or of starch equivalent (S.E.). Rowland (1947) demonstrated that, when the S.E. of the diet is reduced, the solids-not-fat (s.n.f.) content of the milk, in particular the crude protein fraction, is lowered. More recently Gould (1960) pointed out that periods of low herd fertility tend to coincide with periods of low s.n.f. Edwards (1958) made a study of 14 herds with a history of poor quality milk. At the time of the investigation they were all on "very good quality" grass but were not thriving as well as might be expected. Only 4 of the herds were receiving supplementary feeding according to milk yield. Six others were receiving a little at milking time while the remainder got no extra feeding at all. Edwards concluded that inadequate feeding was a major factor in causing the lowered s.n.f. in these herds and indicated a tendency for sub-standard milk to be produced by cows which had an interval betwen calving and successful service of 195 to 255 days. In the present study such animals would be classified as infertile although it is not possible to say into which categories they would fall since Edwards unfortunately did not differentiate between delay in conception due to suppression of oestrus and that due to unsuccessful services.

It would therefore appear justifiable to re-state Snook's theory in terms of S.E. This would mean that grazing animals with an inadequate S.E. intake could be expected to react to the deficiency either by lowering their milk yield or by becoming infertile. Conversely, if the supplementary feeding of such animals were increased to an adequate level not only should the fertility of the higher-yielding cows improve but the milk output of lower-yielding animals could be expected to increase towards that of which they are potentially capable. Since inadequately supplemented grazing cows will be deficient in both S.E. and phosphorus it would be important to ensure that the supplement provided not only the necessary additional S.E. but adequate phosphorus as well.

What seems to be essentially the same type of relationship between milk yield, inadequacy of the diet and infertility in cows at grass has recently been briefly described by McClure (1961) in New Zealand. The condition is said to result from "nutritional lactational stress," being apparently associated with failure to regain weight lost under the stress of increasing milk production during early lactation. It is characterised by returns to service with irregular, usually increased cycle lengths. In its milder form adults are affected but not first lactation cows. The more severe form affects all ages and groups of lactating cows. It rarely occurs where reasonable amounts of silage are fed in addition to grazing. The absence of any mention of post-parturient suppression of oestrus as part of the syndrome is perhaps significant in view of our own findings.

Calving Interval

There is a tendency in the literature for herd fertility to be assessed in terms of a single criterion such as the calving interval. That such methods can be misleading is indicated by the data in Table I where the mean calving interval for those cows giving more than 40 lb. of milk per day is 395.8 days while that of the cows giving 40 lb. or less per day is 396.6, suggesting that there was no difference in fertility between the 2 groups, whereas in fact there are important differences in the types of infertility present. As indicated in the introduction, this is possibly one of the reasons why some workers have failed to show a relationship between milk yield and infertility.

Acknowledgments.—The author wishes to express his thanks to the owners of the herd for allowing him free access to their records, to Mr. I. B. Munro, M.SC., M.R.C.V.S., of the Cattle Breeding Centre, Shinfield, for helpful suggestions and to Dr. L. C. Snook for permission to refer to his unpublished work.

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NEW FOOT-AND-MOUTH INFECTION IN CORNWALL

Foot-and-mouth disease was confirmed among cattle on August 14th, at Trebursye, Launceston, Cornwall.

An area extending for approximately 10 miles around the infected premises has been declared to be an Infected Area.

Animals may not be moved in the Area without a licence and the holding of markets in the Area is restricted.

Pulmonary Anthrax in Cattle

BY

B. McCULLOCH

**Ministry of Agriculture and Co-operative Development,
Veterinary Investigation Centre, Arusha, Tanganyika**

SUMMARY.—A pulmonary condition closely resembling contagious bovine pleuropneumonia, and caused by Bacillus anthracis *was investigated.*

The post-mortem *and bacteriological findings are described.*

There were no clinical features to be observed.

Introduction

LUNGS from cattle slaughtered at Tanganyika Packers meat factory have been examined periodically at the Veterinary Investigation Centre, Arusha, as belonging to possible cases of contagious bovine pleuropneumonia.

The technique of confirmation was the plate agar diffusion test as described by White (1958). Standardised preparations obtained from the East African Veterinary Research Organisation, Kenya, were used in the tests.

Nine lesions of similar appearance were investigated over a period of 6 months and of these, 1 was proved to be active contagious bovine pleuropneumonia, 3 were attributed to *B. anthracis*, 1 to *Corynebacteria* and 4 were not diagnosed.

In the work recorded consideration is given to the isolation of *B. anthracis* from localised lung lesions in cattle.

Pathology

Macroscopically the lung lesions were circumscribed areas of 3 to 4 inches in diameter, showing interstitial fibrosis, interstitial oedema and varying stages of pulmonary hepatisation. Invariably there was fibrous extension to the pleura. Lesions were situated towards the ventral borders, were single, and showed no lobe predilection. No serous exudate into the pleural cavities or fibrinous pleurisy was observed.

Microscopical examination of smears from the lesions failed to show organisms in noticeable numbers.

No other lesions were seen in the carcases.

Cultural Studies

Cultures were made from the lesions aerobically on to blood, nutrient, McConkey and desoxycholate agars and anaerobically on to blood agar. In the cultures eventually found to yield *B. anthracis* 1 to 5 colonies of Gram-positive, spore-bearing bacilli were observed within 24 hours. When no such colonies were observed the lesion, which had been preserved in a refrigerator, was cultured again. This procedure had in the past been observed to result in the subsequent isolation of colonies.

The identity of the bacillus as *B. anthracis* was confirmed by the examination of blood and spleen smears from the mice which died from inoculated broth culture.

It was observed that colonies grew better on blood agar than on nutrient agar; that surface colonies did not exhibit the characteristic curled hair lock appearance of *B. anthracis;* that growth anaerobically and in broth was poor; and that no growth occurred on McConkey or desoxycholate agars.

Pathogenicity for mice was variable. Death occurred within 24 to 48 hours or alternatively only 1 mouse of 3 inoculated died. Examination of spleen smears from dead mice showed *B. anthracis* in the characteristic form of short chains with well defined capsules, and cultures from livers and spleens gave pure growths of bacilli indistinguishable from those isolated.

Discussion

The Tanganyika Packers meat factory at Arusha draws cattle from the Northern and part of the Central Provinces of Tanganyika, and from part of the Southern Province of Kenya.

Contagious bovine pleuropneumonia is enzootic in the Loliondo Division of Masailand, Northern Province and in adjoining areas of Kenya. Despite quarantine measures a certain amount of illegal cattle movement occurs and therefore offers a constant threat to livestock in clean areas.

As the meat factory draws stock from areas near to existing quarantines, any animal which shows signs of pleuropneumonia is subject to careful examination. It has been shown that a number of these cases appear to be an avirulent form of pulmonary anthrax, and because of the dry season incidence it is suggested that dust may be a predisposing factor. Anthrax is enzootic in Tanganyika.

It is of interest to note that the one single confirmed case of contagious bovine pleuropneumonia came from the quarantined area in an escorted and closely supervised herd, which was marketed, trekked, slaughtered, and processed at the meat factory, as part of "Operation Dunkirk" (1960), an official exercise designed and executed to relieve stock pressure within the quarantine.

Acknowledgments.—The author is grateful to the Commissioner of Veterinary Services, Tanganyika, for his permission to publish; to the Director of The East African Veterinary Research Organisation, Kenya, for supplies of standardised preparations; to Mr. P. D. Thomson of Weybridge, Surrey, for examining an isolate and confirming its identity; and to Mr. J. McClement, who first drew attention to the condition. Thanks are also due to Mr. Sangu and Mr. Msamba for technical assistance.

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Divisional News

THE NIGERIAN VETERINARY ASSOCIATION

A general meeting was held in the Conference Room, Federal Department of Veterinary Research, Vom, on December 3rd, 1960. The President, Mr. T. M. Leach, was in the chair. Twelve members were present.

Minutes

The minutes of the previous general meeting, held in Vom, on May 27th, 1960, having been circulated to members, were read and signed. Matters arising from the minutes are included under correspondence.

Correspondence

Memorandum on Terms of Service. Receipt of the Association's memorandum was acknowledged by the Establishment Division, Northern Region Ministry of Finance, the Federal Establishment Office, Ministry of Pensions, and the Western Region Treasury. The third of these informed the Association that the salary entry point for veterinary officers, and the opening of the Scale "A" extension, were both under consideration, but that the Association's other proposals for improving recruitment were unacceptable.

Resignation. Mr. A. G. Willder retired from the appointment of chief veterinary officer, Western Region; his resignation from the Association was accepted with regret. Miss H. J. Chaplin, who acted for the honorary secretary/treasurer during his absence on leave, had already acknowledged Mr. Willder's letter. In this he was thanked for his work done on behalf of the Association.

Paper by Mr. R. H. Johnson

Mr. R. H. Johnson gave a paper entitled "General Aspects of Tissue Culture." After briefly reviewing the history of tissue culture, he discussed the application of the technique to virus multiplication. Work in this field at Vom is at present concentrated on the production of a tissue culture rinderpest vaccine.

Workers in East and West Africa have failed to establish attenuated strains of rinderpest virus (caprinised, lapinised or avianised) in tissue culture. However, in 1957, Plowright reported that he had adapted the semi-virulent "Kabete O" strain to kidney cells, and, after several passages, it showed attenuation. At Vom, this adapted strain was found to be safe and effective in N'dama and Zebu cattle. Used in one outbreak, it gave as much protection as goat adapted and rabbit adapted strains. In addition, Muturu calves from susceptible dams were inoculated without ill-effects, and, later, resisted natural challenge. Immunity was shown to be solid up to 14 months to date.

Production is simple, and 100,000,000 (50 per cent.) cattle immunising doses can be produced from one pair of kidneys in 8 days. Freeze drying and field safety factors reduced this figure to 1,000,000 doses. The virus appears to be more resistant to adverse conditions than lapinised virus, but less so than caprinised virus. A disadvantage is the possibility of latent viruses from the tissues being incorporated in the vaccine. To reduce the risk of this occurring, cell-lines of kidney cells are used. The constant cytopathogenic effect of rinderpest virus on these cells gives an accurate method of determining the presence of neutralising antibodies in sera. Whether or not it will be practicable to use the vaccine in the field is being determined by viability tests now in progress.

Paper by Mr. A. J. McLeod

Mr. A. J. McLeod gave a paper on a study visit he had recently paid to Japan, under the auspices of FAO. He spent most of his stay working at the Nippon Institute for Biological Science with Dr. Nakamura—an authority on rinderpest vaccines. In Japan, vaccines are produced by several private laboratories. The National Veterinary Assay Laboratory collects random samples from all batches of privately produced vaccines, and tests them for potency and safety.

There are over 16,000 veterinarians in Japan serving a livestock population of 7,000,000 cattle, pigs, goats and sheep. These figures are in contrast to the situation in Great Britain, where some 4,000 members in practice service a livestock population of about 42,000,000. About 4,000 Japanese veterinarians are in practice; 4,500 serve as Government field officers; 2,500 are employed by Local Authorities; 5,000 by private organisations, and 500 are employed in research. There are 14 veterinary schools in Japan, 3 of which are privately run institutions.

The beef industry is being developed. Kobe Beef, from the Black Japanese breed, is comparable in quality to Aberdeen-Angus beef.

Considerable discussion followed both these talks, and the speakers answered questions. The President proposed a vote of thanks to Mr. Johnston and Mr. McLeod.

The annual general meeting was held in the Conference Room, Federal Department of Veterinary Research, Vom, on February 18th, 1961. The President, Mr. T. M. Leach, took the chair. There were 16 members and visitors present.

Minutes

In the minutes of the previous annual general meeting, which were circulated to members, the honorary secretary/treasurer reported that the following sentence was omitted: "Mr. E. P. Lindley and Mr. E. D. Wright were appointed Honorary Auditors to check the finances of the past year." This sentence was inserted into the official copy of the minutes, and there being no other amendments, they were approved and signed by the President.

Business Arising from the Minutes

Auditors' Report. Messrs. Lindley and Wright, the auditors, reported that they had examined the

accounts on December 14th, 1960, and found them to be in order. There was a credit balance of £26 17s. 4d. The Auditors' Report was accepted.

Memorandum on Terms of Service. The President informed the meeting that the sub-committee appointed at the last annual general meeting met on the previous day to consider replies receievd from the Nigerian Governments to the Association's memorandum. The sub-committee agreed on further action in the light of these replies.

Election of Members

The following were elected as members of the Association:—

Mr. R. W. Crowther, Mr. M. P. Lemche, Mr. E. Overby, Miss E. A. Struthers.

Higher Veterinary Education in Nigeria

In his introduction to this discussion, the President referred to the recent report of a committee of the Royal College of Veterinary Surgeons on veterinary education in underdeveloped countries, and summarised the recommendations respecting veterinary education in the Ashby Report on Post-School Certificate and Higher Education in Nigeria. These included the forecast that Nigeria would require 800 veterinarians by 1970, while the Nigerian Governments' estimates totalled 300. The President then introduced the 3 speakers.

Mr. R. M. Gambles, Principal of the Veterinary School, Federal Department of Veterinary Research, Vom, described the attempt made some years ago to run a 5-year course in Vom closely following the M.R.C.V.S. syllabus. Out of 11 students who started the course, only 3 completed it. It was an ambitious effort, as there were only one or two full-time teaching staff. Their instruction was supplemented by part-time training by laboratory staff.

For the past 12 years or so, many people have hoped that a full University course will be started. The Ashby Report suggested that a 4-year course of university standard should meet Nigeria's immediate needs, provided students passed the G.C.E. at "A" level before entry. The speaker said he found there were serious gaps in the basic education of many students. Though they might be bright in veterinary subjects, many showed a grave lack of knowledge in arithmetic, for example. If the length of the course was to be 4 years, the curriculum would have to be severely pruned, and a high standard maintained in the essential subjects.

Mr. E. O. Ezebuiro, Veterinary Research Officer, Federal Department of Veterinary Research, Vom, opened his remarks by paying tribute to the members of the profession who had surmounted many difficulties in starting and running the Veterinary School at Vom. However, veterinary education at university level was now long overdue in Nigeria. In considering the suggestion in the Ashby Report, that 30 students should enter the university school annually, it must be remembered that only 16 students at this level entered the Medical Faculty of the University College, Ibadan, last year. If G.C.E. "O" level in biology, chemistry, and physics, was accepted for entrance, it would probably be necessary to extend the course to 6 years.

The speaker felt it was difficult to assess aptitude and enthusiasm at an interview, and suggested that applicants should work under veterinary officers in the field, to assess their suitability before entering the university. He considered that all veterinary students should take their pre-clinical training at one centre, rather than at 3 separate regional colleges, and that all the departments of a veterinary school should be in one place. He also stressed the importance of animal management throughout the course. It was important that high standards should be maintained, so that graduates would be able to profit later from higher studies abroad. In order to attract enough able teachers, salaries competitive in the world market would have to be paid, and, to give effective training, the staff should study veterinary and social problems in Nigeria.

Dr. D. H. Hill, Senior Lecturer, Faculty of Agriculture and Veterinary Science, University College, Ibadan, said he was broadly in agreement with the remarks of the two previous speakers. Animal products earned about 7 per cent. of the gross income of Nigeria, and so an outlay for veterinary education was a good investment. The speaker hoped to see 1 veterinarian for every 50,000 animals; the Ashby report stated that the absolute minimum requirements of the country were 160 veterinarians.

In 1949 Professor J. G. Wright visited Nigeria to advise on the problem of veterinary education. He suggested running the pre-clinical course at Ibadan and the clinical medicine and surgery at Vom. Mr. Ezebuiro stressed the need for the whole course to be given at one centre, but Dr. Hill thought Professor Wright's suggestion would be acceptable, although he realised the difficulty of having pre-clinical teaching in one place and clinical teaching in another. Professor R. Lovell endorsed Professor Wright's recommendations after visiting Nigeria in 1954. However, the R.C.V.S. felt the proposed degree standards would not quite measure up to those required for M.R.C.V.S. registration of students taking the B.Vet.Med., under the University College's special relationship with London University.

The speaker expressed the view that the University College, Ibadan, was the only centre in Nigeria, at present, capable of teaching pre-clinical subjects adequately. Veterinary, medical and dental students could study several subjects together, as is the practice in many other universities. The pre-clinical course should embrace all the subjects normally taught in the first 3 years.

The subject was then opened for general discussion and the following are some of the points made:—

Mr. A. L. C. Thorne stressed that many extensions and alterations would be necessary before the premises at Vom would reach university standard, and a much larger teaching staff would be required. It was also important to remember that prospects for veterinarians needed to be good before enough Nigerians would undertake the protracted and arduous course.

(*Concluded at foot of col. 1 overleaf*)

Current Literature

BOOK REVIEW

Animal Husbandry Heresies. By ALLAN FRASER. Lockwood (Crosby) & Son Ltd., London (1960). 30s.

To bunk or debunk? Many of us, when faced with an arbitrary dictum promulgated by our betters prefer to run rather than stay to argue; but not so the author of this book. He has taken the cross upon himself and we should be glad of it. Wherever such matters as breeds and breeding, or shows and showing, and such controversial agricultural matters are discussed; a great deal of hot air is generated as a result of the friction created by the impact of the dyed-in-the-wool advocates versus the sceptics.

If we are honest, we must admit that we have accepted too readily popular prejudices to gain commercial advantage or snob value or have accepted them just because we have not thought about their implications.

To read this book is to become alarmed at the degree of complacency which we have achieved regarding the acceptance of many common fallacies. When we are pressed we may well squirm under the challenge: that there is no commercial justification for the use of the term "pure bred" in relation to pedigree stock; or that the impression of uniformity conveyed by parades of livestock at shows is important, whereas it is largely fictitious—since the animals exhibited are a selection from, and not a sample of the breeds concerned. Appearances of animals in the show ring were aptly described by Lysenko as their "shirts," but the bodies under the shirts of any particular colour may be extremely variable, and what is of more importance from the animal production point of view? Is not pedigree just a trade mark? "You should study the Peerage, Gerald, it is the best thing in fiction the English have ever done!" Probing criticisms there are in abundance; and whilst these make serious reading, we can often laugh with the author with a sense of guilty relief when we consider Bakewell flouting scriptural injunction by giving free play to incest in the safe privacy of his farm, or reflect at the chance of selection which must have rescued the village bull from becoming a village ox.

From the practical point of view it is pleasing to note the emphasis placed on the great importance of environment on the animal. Only one fifth of the variability in milk yield between one dairy cow and anothed is attributed to the breeding factor; the remaining four fifths resulting from differences in feeding and management.

How far each of us has strayed from the path of common sense is for the individual to say. But for those who wish to adjust their perspective and make a reappraisal of existing "folk lore" in the agricultural world—then here is a book to help them remove the scales of prejudice and partiality.

News and Comment

VETERINARY PRACTICES AS LIMITED COMPANIES

It will be remembered that paragraph 48 of the revised Guide to Professional Conduct reads as follows:—

"The formation of private limited companies of practitioners.

"The Council has been asked to advise on the legal and ethical considerations which might be involved if a practitioner or a partnership of practitioners desired to incorporate a veterinary practice as a private limited liability company.

"The legal aspect concerns the interpretation of Section 5 of the Veterinary Surgeons Act, 1948, which states that 'no person shall practise, or hold himself out as practising, or as being prepared to practise, veterinary surgery unless he is

(a) registered in the Register of Veterinary Surgeons, or

(b) registered in the Supplementary Veterinary Register.'

It would appear clear that a company, as an unqualified person, could be convicted for holding itself out as being prepared to practise veterinary surgery.

"The ethical aspect concerns the association of a practitioner with unqualified persons. Firstly, the company itself in law is an unqualified person whilst, secondly, it is possible that the direction of the company might fall into the hands of unqualified persons with whom it would be unprofessional for a practitioner to associate.

"It has also been pointed out that the principal advantage of a limited liability company was the limitation of the liability of its shareholders to the fully paid up value of their shares. This would appear to be contrary to the generally accepted view that a professional man's liability to persons with whom he deals is unlimited.

Divisional News.—*Concluded.*

Mr. D. E. Macgregor considered it undesirable to abandon the benefits of teaching at Vom, which had the greatest concentration of veterinarians in Nigeria.

Mr. A. A. Forsyth recalled his experience as Veterinary Adviser to the Government of India. In Calcutta, both medical and veterinary students needed the same entrance standards; this overcame any feeling of inferiority on the part of the veterinary students. Interest in veterinary education was such that 400 applications were received for 36 places.

Dr. L. E. Stephen stressed the need for having the same entrance standards for medical and veterinary training.

Mr. P. G. T. Moren considered one national veterinary school would be adequate. In Finland there were too few students to justify a veterinary college; and the Finnish students trained in Stockholm.

After replies from the principal speakers, the President proposed a vote of thanks to those concerned.

"The Council, therefore, having considered the various aspects of the matter, advises against the formation of private limited liability companies by practitioners."

The Council of the College, which is constantly engaged in revision of its rulings in the light of changing circumstances and having had requests for guidance by various members on whether it would be proper to incorporate some form of service company, took legal opinion on the problem.

It was advised that the Council's present ruling, as to the formation of partnerships or individual practitioners in private limited companies, was proper and correct.

It was advised, however, that for the purposes of the legitimate avoidance of some aspect of taxation it would be proper for practitioners to form what are known as service companies provided that there was a complete severance between the professional and non-professional activities of the veterinary profession except in-so-far as the employees of the practices are employed and paid by the service company and not by the practice.

It would be proper, therefore, for a service company to be formed subject to the following conditions:—

(a) the liability of the company should be unlimited;

(b) the company must in no way be capable of being considered as practising or holding itself out as practising, or being prepared to practise veterinary surgery;

(c) it must be clearly understood that every veterinary surgeon, by whom a service company is formed or with whom he is associated, remains professionally responsible to the Council of the College for acts done by the company and/or its services as he would be if that act was done by himself and/or his own employees.

The Council desires to emphasise how essential it is that legal and accountancy guidance should be sought before any such enterprise is commenced. It would appear that the advantages to be gained would only be applicable to a very few practices with a very large turnover.

BROADCAST APPEAL FOR UFAW BY B.V.A. PRESIDENT

This appeal will be made by Mr. Sydney Jennings on August 27th, 1961, at 8.25 on all Home Services. Our President is also President of UFAW's Veterinary Section. It will be recalled that he recently received the Livesey Medal which is given at intervals of not less than 3 years by the Council of the Royal College "to the person who in their judgment has done the most serviceable work towards the prevention and/or alleviation of pain and/or fear in animals."

UFAW was founded 35 years ago by Major C. W. Hume, then a student at Birkbeck College, who considered that animal welfare merited the attention of professional people and of university students. Since then its scientific and unsentimental approach to the problem of reducing animal suffering has gained it the confidence of veterinary, scientific and government circles, and it recently held a symposium, attended by leading scientists from all over the world, on the assessment of pain in man and animals.

MR. E. LIONEL STROUD

Professor McCunn writes:—

Lionel Stroud died at his home in Ealing on August 1st, 1961. He was in his ninetieth year and had outlived most of his contemporaries. To those of the younger generation, many of whom take little notice of the history of their profession, the name Stroud may pass unnoticed, but this was a man who, during his long professional life, did much to advance the prestige and dignity of his profession.

Lionel Stroud graduated from the London College in December, 1895, and he obtained the Fellowship of the R.C.V.S. in May, 1902. Soon after qualifying he joined the late Mr. Rotheram who practised in the West End of London and had the honour to be veterinary surgeon to H.M. Queen Victoria. Stroud likewise had this honour and Her Majesty held them in such high regard that she called their premises the Royal Canine Hospital. There was much controversy in the profession about this appellation but the two partners rode the storm. Stroud was one of the first veterinarians to devote practically all his attention to the smaller animals and for many years there was only one other practice of this character in London, *i.e.* that of A. J. Sewell in Elizabeth Street, Sloane Square.

For many years, until the premises were damaged by bombs during the 1939/45 war, Stroud practised from premises at 55, South Molton Street. He resided in Ealing and it was at this address that he carried on his practice subsequently. He retired from active work at the age of 85.

He was a handsome man of courtly manner and approach. His attire was that of a Harley Street physician and his hair, moustache and beard were a delight to behold. It is said that a renowned West End hairdresser waited upon him daily. In spite of this Stroud was not by any means a fop: he was an alert and vigorous man with very definite ideas as to how a professional man should conduct his affairs and present himself before his clients and the public.

Apart from his professional activities it may be said that Stroud had two major interests in his life, the Central Veterinary Society and Freemasonry. He joined the Central soon after graduation. In February, 1900, he became its secretary on the departure of W. S. Mulvey to go to the Boer War with the C.I.V. He was President of the Society in 1904/5 and if one reads his presidential address it is obvious that he was a man of vision and he had great ideas as to the future of the profession. He advocated university status for the schools. In October, 1905, he became treasurer of the Society and held office until 1930. During this time he laid the foundation of the Society's present satisfactory economic state. During all these years Stroud was a "king pin" of all the Society's activities. In

Freemasonry also he was extremely active. He rose to very high rank and was known in those circles all over the country. For many years he was in great demand and at one time it was not unusual for him to be on masonic business most evenings of the week.

Those who gain their livelihood from small-animal practice are indebted much to Lionel Stroud. He took it from a place below the salt to the high table. He told me that he had only one horse client, the owner of a big working stud in the City. The owner was a personal friend and insisted on Stroud doing his work but in the latter's own words "It was a d . . . . . nuisance."

Stroud was a first year student during the centenary year of the Royal Veterinary College (1891) Each student was given a handsome silver medal to mark the occasion. It bears the College arms, and the student's name is inscribed on the obverse side. Lionel Stroud gave me his medal, and it now forms the centrepiece of the medallion worn by the President of the Royal Veterinary College Association.

He was cremated at Mortlake on August 5th, in the presence of a few friends and brothers, quietly and without ostentation by his own expressed wish.

UNIVERSITY NEWS

London

Veterinary Pre-clinical Examination: Part I

Amiel, Donald Keith; Andrews, Anthony Hunter; Ashton, Arthur Paul; Bennett, Adrian John; Bensareiti, Abdalla Adbelrazeg; Beynon, David Kenneth; Bolton, Thomas Bruce; Bowditch, Jeremy George; Brown, David; Charlesworth, Christopher; Clark, Paul; Davidge, Edward John; Davidson, Alastair Charles; Davidson, Robertson Charles; Davies, Graham; De Ville, Patrick; Drewitt, Michael St. George Napier; Evans, David John; Gosling, Peter Geoffrey Robert; Haddon, John Herbert; Harvey, Simon Francis; Haverson, Roger; Jackson, Ian; Jiya, Mamman; Jones, David Gareth Clayton; Jones, Ivan Arthur Francis; Kendrick, John Alexander; Kilby, Stanley Henry; Kynoch, Ian Sanderson; Leedale, Alison Heath; Lewington, John Henry; Linstead, Margaret Elizabeth; Mendham, John Henry; Morgan, Robert Powell; Orhan, Ustun Ahmed; Pembrey, David Seymour; Penfold, John William Francis; Pinney, Maurice Owen; Plumley, Peter Ian; Pratt, Jan Stanton; Roberts, Charles; Robinson, Norman Edward; Robinson, Peter John; Scott, Andrew; Sheppard, Michael Thomas; Slaughter, Ralph Edward; Spedding, Royston Neil; Spicer, Charles John; Steel, Kathleen Mary; Taylor, David Malcolm; Thompson, Graham Victor; Thorp, Michael Leonard; Underwood, Philip John; Vonesch, Richard Joseph Keating; Westhead, Roger William; Womar, Stewart Matthew; Woodger, Gerald John Ashdown; and Woollon, Robert Mansell.

Bachelor of Veterinary Medicine, June, 1961

PASS

Ball, Frederick Charles; Denly, Ian Winter; Ellwood, David Charles; Flint, Peter Anthony; Freeman, Roger; Garner, Lawrence John; Goni, Musa; Johnstone, Michael William; Lonnon, Peter Howard; Lynfield, Patricia Jillian; Mann, Christopher James; Norris, Raymond John; Potter, Brian Stuart Harvey; Randall, Peter Mead; Robins, David Hilton; Saint, Sheila Chaffey; Ward, Derek Kimberley Peter; Willott, John Arthur; Wilson, Robin William.

THE REGISTER OF VETERINARY SURGEONS

The undermentioned gentleman was admitted to membership of the Royal College of Veterinary Surgeons on August 10th, 1961, in virtue of the registrable degree of M.V.B. conferred on him by the National University of Ireland on July 15th, 1961:—

Kieran, Joseph Brian, Darnley Arms, Athboy, Co. Meath, Eire.

The undermentioned graduates were admitted to membership on August 9th, 1961, in virtue of the registrable degree of B.Vet.Med. conferred on them by the University of London:—

Ball, Frederick Charles, "Westholme," Manor Farm, Thorpe, Egham, Surrey; Denly, Ian Winter, 105, Halsford Park Road, East Grinstead, Sussex; Ellwood, David Charles, 29, Hurst Road, Chedgrave, Loddon, Norfolk; Flint, Peter Anthony, Brynhyfryd, Llanyre, Llandrindod Wells, Radnorshire; Freeman, Roger, "Shenstone," Wickwar Road, Kingswood, Wotton-under-Edge, Gloucestershire; Garner, Lawrence John, 89, Hodshrove Road, East Moulscoomb, Brighton, 7, Sussex; Goni, Musa, Veterinary Dept., Maiduguri, Nigeria; Johnstone, Michael William, 35, Inner Park Road, Wimbledon Common, London, S.W.19; Lonnon, Peter Howard, 10, Llwynderi Road, Newport, Mon.; Lynfield, Patricia Jillian (Miss), 1, West Heath Close, London, N.W.3; Mann, Christopher James, 34, Trevethan Road, Falmouth, Cornwall; Norris, Raymond John, 51, Dawes Avenue, Hornchurch, Essex; Potter, Brian Stuart Harvey, 27, Muswell Avenue, London, N.10; Randall, Peter Mead, 50, Ongar Road, Great Dunmow, Essex; Robins, David Hilton, 55, Wedhey, Harlow, Essex; Saint, Sheila Chaffey (Miss), "Friar's Keep," Monks Well, Moor Park, Farnham, Surrey; Ward, Derek Kimberley Peter, 1, Balsam Park, Wincanton, Somerset; Willott, John Arthur, 61, Warren Way, Dripwell, Welwyn, Herts.; Wilson, Robin William, 83, Cholmley Gardens, London, N.W.6.

R.C.V.S. OBITUARY

We record with regret the death of the following member of the profession:—

KIRKPATRICK, Andrew Clements, Private Bag, Elandsfontein Rail, Transvaal, South Africa. Graduated from the Royal Veterinary College of Ireland. July 19th, 1910. Died in the Biksberg Hospital, April 2nd, 1961.

PERSONAL

Mr. G. C. Allen, Chief Veterinary Officer to the city of Birmingham, has been elected to the Council of the Royal Society of Health.

Births

BEACH.—On August 11th, 1961, at 41, Clive Close, Potters Bar, Middlesex, to Dorothy, wife of Joseph E. Beach, M.R.C.V.S., a son, Eric James.

CLEVERLY.—On August 10th, 1961, to Rosemary, wife of J. M. Cleverly, B.VET.MED., M.R.C.V.S., of Helliscote, High Street, Odiham, Hants., a daughter, Elizabeth.

GRAY.—At Cuckfield Hospital, Sussex, on July 27th, 1961, to Brenda, wife of Colin G. Gray, M.R.C.V.S., a daughter, Linda Susan, sister for Nigel.

KETTLES.—On July 31st, 1961, to Christine, wife of Andrew S. Kettles, B.SC., M.R.C.V.S., of 18, Limetree Road, Ulverston, a daughter, Morag Gair.

Marriages

ILLING—GIBBONS.—On July 28th, 1961, at St. Mary Magdalene, Enfield, Oliver Illing, B.VET.MED., M.R.C.V.S., to Janet Elaine Gibbons, B.VET.MED., M.R.C.V.S.

HENWOOD—HENDERSON.—On Saturday, July 1st, 1961, at St. Deny's Church, Evington, Leicester, John Keith Henwood, M.A., VET.M.B. (CANTAB.), M.R.C.V.S., of Durban, South Africa, to Philippa Henderson of Leicester.

MOFFAT—SHIELDS.—On Saturday, July 22nd, at St. Christopher's Church, Sennelager, Westphalia, Germany, between Captain Scott Colin Moffat, B.V.M.S., M.R.C.V.S., R.A.V.C., of McEwen Drive, Inverness, to Sally Rita Shields of Woodford Green, Essex.

COMING EVENTS

September

2nd (Sat.). STREATLEY '58 CLUB REUNION. Annual Dinner at "Ye Miller of Mansfield."

3rd to 9th (Sun. to Sat.). 79th Annual Congress and Exhibitions of the British Veterinary Association at Oxford.

7th (Thurs.). ROYAL VETERINARY COLLEGE ASSOCIATION. Annual Dinner during the B.V.A. Congress at St. Edmund's Hall, Oxford.

GLASGOW VETERINARY SCHOOL ALUMNUS ASSOCIATION. Dinner at the Mitre Hotel, Oxford, 7 p.m.

ROYAL (DICK) SCHOOL OF VETERINARY STUDIES ALUMNUS ASSOCIATION. Annual General Meeting and Dinner in the Oxford Sports Club, 7.40 p.m.

ADDRESSES OF DISEASE INFECTED PREMISES

The list given below indicates, first the date on which disease has been confirmed, followed by the postal address and local authority.

Anthrax

August 11th, 1961. W. D. Powell, Potecote House, Towcester, Northants (Parish: Cold Higham). (Cattle.) NORTHAMPTONSHIRE.

Foot-and-Mouth Disease

August 14th, 1961. R. E. Daniel, Trebursye, Launceston, Cornwall. CORNWALL.

Fowl Pest

August 9th, 1961. Mrs. F. Maidment, Prospect House, Thirn, Ripon, Yorks. YORK, NORTH RIDING.

August 10th, 1961. G. A. Symonds, 2, Home Farm Cottages, Shrublands Park, Coddenham, Ipswich, Suffolk. EAST SUFFOLK.

August 10th, 1961. M. J. Smith, Cherrytrees, Belstead, Ipswich, Suffolk. EAST SUFFOLK.

August 14th, 1961. J. Woof, 12, Martholme Lane, Great Harwood, Blackburn, Lancs. LANCASHIRE.

Swine Fever

August 8th, 1961. W. Jones, Meitty Fawr Farm, Trecastle, Brecon. COUNTY OF BRECON.

August 8th, 1961. J. D. John, Lower Lochvane Farm, Penycwm, Haverfordwest, Pembs. PEMBROKESHIRE.

August 8th, 1961. S. H. Bovingdon, Bell Farm, Bell Foundry Lane, Wokingham, Berks. BERKSHIRE.

August 8th, 1961. G. & R. Carter, Strike Farm, Strike Lane, Freckleton, Preston, Lancs. LANCASHIRE.

August 8th, 1961. S. F. Smith, 37, Baccabox Lane, Hollywood, Birmingham. Disease at: Bell Green Farm, Wythall. WORCESTERSHIRE.

August 8th, 1961. R. J. Povey, Hillside, Radyr Court, Radyr, Cardiff, Glam. GLAMORGAN.

August 8th, 1961. Mrs. E. R. Sulley, Moor Croft Farm, Weston-in-Gordano, Bristol. SOMERSET.

August 8th, 1961. Mrs. C. H. Colquhoun, Colquhoun Arms Hotel, Luss, Alexandria, Dunbartonshire. DUNBARTONSHIRE.

August 8th, 1961. J. H. Walker, Hollydale, Graves Lane, Edingley, Newark, Notts. NOTTINGHAMSHIRE.

August 8th, 1961. H. Ball, Dains Mill Farm, Upperhulme, Leek, Staffs. STAFFORDSHIRE.

August 8th, 1961. J. Potts, White Cottage, Windlestone, Ferryhill, Co. Durham. COUNTY DURHAM.

August 9th, 1961. J. T. Davies, Drumber Farm, Betchton, Sandbach, Cheshire. CHESHIRE.

August 9th, 1961. J. E. Parker, Pinehurst, Bowl Road, Charing, Ashford, Kent. KENT.

August 9th, 1961. C. C. Pearson, Brattle Cottage Farm, Brookland, Romney Marsh, Kent. KENT.

August 10th, 1961. J. T. Parsons, Grange Farm, Hutton, Weston-super-Mare, Somerset. SOMERSET.

August 10th, 1961. H. B. Collins, Cotts Park Farm, Uzmaston, Haverfordwest, Pembs. PEMBROKESHIRE.

August 10th, 1961. F. Richards, Green Farm, Ladock, Cornwall. CORNWALL.

August 11th, 1961. A. Taylor, Hillcroft, West End, Norton, Doncaster, Yorks. YORK, WEST RIDING.

August 11th, 1961. L. Reynolds, 29, Kingsmeadow, Clent, Stourbridge, Worcs. Disease at: Vinefields Vine Lane, Clent, Stourbridge, Worcs. WORCESTERSHIRE.

August 11th, 1961. L. R. Whittred, 48, The Street, Hindolvestone, Dereham, Norfolk. NORFOLK.

August 11th, 1961. W. C. Griffiths, Nant-yr-Hwch, Newbridge-on-Wye, Llandrindod Wells, Radnor. RADNOR.

August 11th, 1961. W. C. Lloyd, Plas Newydd, Llanfair, Talhaearn, Abergele, Denbighs. DENBIGHSHIRE.

August 14th, 1961. W. N. Stockdale, Middleton Grange, Hutton Rudby, Yarm, Yorks. YORK, NORTH RIDING.

August 14th, 1961. J. V. Jenkins, Arnolds Down Farm, Haverfordwest, Pembs. PEMBROKESHIRE.

August 14th, 1961. D. W. Chapman, Bainesse Farm, Catterick, Richmond, Yorks. YORK, NORTH RIDING.

August 14th, 1961. H. J. Bartlett, Matravers Bungalow, Uploders, Loders, Bridport, Dorset. Disease at: Piggeries, Matravers Farm, Uploders, Dorset. DORSET.

Foot-and-Mouth Disease Infected Area

Area: Cornwall. Those parts of the counties of Cornwall and Devon which lie within approximately 10 miles of Trebursye, Launceston. 1 outbreak within infected area. First outbreak in infected area confirmed August 14th, 1961. Latest outbreak in infected area confirmed August 14th, 1961.

Letters to the Editor

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

Humaneness of Cyanide Gassing

Sir,—Although in the past we have published pretty conclusive evidence that death through inhaling HCN is painless, many humanitarians are still alleging that killing by "Cymag" entails suffering. This impression appears to be due to the fact that rabbits on being dug out of burrows after cyanide gassing have occasionally been found to be in convulsions. Admittedly the convulsions look horrible and the conclusion has been drawn that they *are* horrible from the rabbit's point of view. Readers of THE RECORD will know that convulsions frequently, or perhaps usually, are associated with unconsciousness; nevertheless the following letter

from my old school-friend Edgar B. Dand may be of interest. He recently wrote to me:—

"I had been putting the powder in some rat-holes and must have been a little careless in keeping the lid off the tin too long. However, having finished the last hole I was on my way to the house when I suddenly fell forward and in the split second I had to think about anything, I thought of the tin and threw it away as far as I could as I fell, as the lid was only loosely on. I fell facing north and when I regained consciousness I was facing south and was kicking with my legs and my face was bleeding from being scratched on the ground. I got up and hurried to the house to wash the blood off my face and sat down to lunch without anyone knowing what had happened. In a few seconds I had controlled my legs from kicking and got up without any shortness of breath or distress of any kind, in fact I had a distinct feeling of well-being."

Yours faithfully,
C. W. HUME,
Secretary-General of UFAW.

The Universities Federation for Animal Welfare,
7a, Lamb's Conduit Passage,
London, W.C.1.

August 8th, 1961.

The Viability of Avian Pox Viruses

Sir,—A characteristic of avian pox viruses is their resistance to drying. Beaudette and Hudson (1941) reported that fowl pox virus in a dry crust, from a wild turkey, was alive after 8 years in a refrigerator. Beaudette *et al.* (1948) found that freeze-dried fowl pox virus in a desiccator over phosphorus pentoxide under vacuum and stored at −20° C. was alive after 9.8 years. Pigeon pox virus kept under the same conditions was also alive after 9.8 years.

We have recently tested the viruses of fowl pox and pigeon pox stored in desicattors over calcium chloride under vacuum at 4° C.

Fowl Pox Virus

This virus in dry crusts was stored from 1.2.27 until 25.5.61. There was no vacuum left in the desiccator. A suspension of crusts was inoculated on the scarified comb of a fowl and on the chorio-allantoic membrane of 10-day embryonated eggs. One pox nodule developed on the comb and was removed on the 14th day. There was no growth on the eggs. A suspension of the nodule was inoculated into eggs and on a fowl's comb. Both eggs and comb were positive. A suspension of the chorio-allantoic membranes was inoculated on a fowl's comb and produced typical pox lesions. The virus had remained alive for 34 years in dry crusts.

Pigeon Pox Virus

Pigeon pox crusts were kept under the same conditions as the fowl pox. The desiccator was in the cold store from 30.10.31 until 25.5.61. A partial vacuum still remained in the desiccator. A suspension of crusts inoculated on the chorio-allantoic membrane of eggs gave extensive growth involving a considerable part of the membrane.

The pigeon pox virus had remained alive for nearly 30 years.

Yours faithfully,
T. M. DOYLE,
J. M. COLLINS,
R. MARTIN.

Central Veterinary Laboratory,
Weybridge,
Surrey.

August 11th, 1961.

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A Case of Delayed Twinning ?

Sir,—Mr. W. M. Barr's letter of May 25th on the subject of delayed twinning and superfoetation calls to mind my one and only encounter with this phenomenon, the details of which may be of interest to him and to others.

According to my case records I was called, on August 4th, 1956, to calve a 4-year-old pedigree Jersey cow, the property of Mr. Max Baer, on his farm in the Lugari area of the Trans Nzoia district of Kenya. After being fortunate enough to deliver a live heifer calf I was informed by the owner that he already had one heifer calf to that animal's credit, born on March 26th of that year, *i.e.* 131 days' interval between calvings. I was shown the 4-month-old (twin), which had already been registered with the Jersey Breeders' Association of Kenya. Mr. Baer assured me that since the first, normal calving in March the animal had shown no sign of abnormality, had evacuated the foetal membranes in the normal manner and had milked well. She had originally been served, by hand service, to calve down in March/April to coincide with the onset of the long rains and had not, to the best of his knowledge and belief, been in oestrus, nor served again at any later date.

At the time I put the case down as one of superfoetation because, although I entirely accepted Mr. Baer's statement, it is not unusual for bulls to jump fences to serve a cow and to be returned to the bull paddock later by the African herd-boy, who would be afraid to report the incident in case he was accused of negligence.

However, this only changes a case of delayed twinning to the equally interesting condition of superfoetation. I made careful notes at the time and the owner furnished me with some excellent photographs of the "mother and twins," but, regrettably, in the manner so common to the busy practitioner in any country I was unable to make that extra effort required to "write it up for THE RECORD."

At this moment, however, I am not so sure of my diagnosis. The similarity in the chronology of the 2 cases, that described by Mr. Barr (138 days) and this one (131 days), appears rather more than coincidental and I wonder how many other cases

of delayed twinning, or superfoetation, show the same approximate period of 4 months between deliveries.

Yours faithfully,
C. R. HOLMES.

Whangarei-Maungatapere Dairy Veterinary Service,
P.O. Box 640,
Whangarei,
New Zealand.
August 7th, 1961.

Poisoning of Cattle by Brazilian Groundnut Meal

Sir,—After cases of poisoning by some consignments of Brazilian groundnut meal had been recognised in poultry (Blount, 1961; Asplin & Carnaghan, 1961) and pigs (Loosmore & Harding, 1961), it seemed reasonable to expect the appearance, sooner or later, of the disease in cattle. The first cases we diagnosed were in calves which had been fed compounds from a miller who had supplied food shown to be toxic for pigs, the groundnut meal incorporated in the calf compound being from the same batches as had been included in the pig foods.

Nine outbreaks of disease in calves, associated with the feeding of these compounds, have been investigated in the area covered by the Reading Veterinary Investigation Centre. Groundnut meal made up 15 per cent. of 2 calf compounds, one a starter ration fed at the rate of 1 to 1¼ lb. a day from 3 to 35 days of age, in addition to milk substitutes, the other fed alone at the rate of 2½ to 8 lb. a day from 5 to 12 weeks of age, after which hay was added to the diet.

With small variations, the history was similar in all cases. A little general malaise was sometimes apparent, otherwise symptoms developed quickly. Amaurosis, aimless walking in circles, frequent falling, ear twitching and grinding of teeth were seen in all the outbreaks. Severe tenesmus was a frequent symptom with eversion of the rectum in many cases. Death usually ensued within 2 days of the appearance of severe symptoms. Sometimes affected animals were merely found dead.

The age incidence ranged from 3 to 9 months, but most affected calves were from 4 to 6 months old. Morbidity varied from 5 to 100 per cent. in affected groups and all clinically diseased calves died. In some outbreaks calves fed identically showed no symptoms and thrived. The toxic meal was present in the diet from early August to the middle of October, 1960. Seven outbreaks occurred between October 10th and November 14th, 1960, the calves having been on the suspect diet for at least 6 weeks. Two further outbreaks occurred in December, in calves fed a compound which had been mixed before mid-October.

Apart from the group of outbreaks described, 2 more were diagnosed in calves fed home-mixed rations containing 10 and 15 per cent. Brazilian groundnut meal respectively. Again the minimum period of intoxication before the onset of symptoms was 6 weeks, while some calves ate the toxic ration for 4 months before showing symptoms.

On 2 farms, following the inclusion of Brazilian groundnut meal as 15 to 20 per cent. of the production ration for 3 to 4 months, cows lost their appetite and suffered a reduced milk yield, especially just after calving. Liver biopsy samples from 3 affected animals showed lesions suggestive of groundnut poisoning as seen in calves. On both farms symptoms disappeared after removal of the meal from the diet.

Other cases of cattle poisoned by Brazilian groundnut meal have been investigated and diagnosed in collaboration with colleagues at 8 other of the Ministry's veterinary investigation centres in England. Most of them occurred in calves; but one outbreak (Clegg, 1961) affected store bullocks aged from 18 to 22 months, which had been fed about 2 lb. of Brazilian groundnut meal daily for about 3 months.

In every case examined at necropsy the liver was pale, firm and fibrosed. Ascites of the peritoneal cavity and oedema of the mesentery were frequently present. Catarrhal enteritis was variably present and eversion of the rectum was a common finding. Cutaneous bruises and contusions, which were sometimes seen, were presumably traumatic in origin.

The histological changes are primarily hepatic and show essentially a remarkable consistency, 4 features being invariably present, albeit in varying degree: considerable proliferation of bile duct epithelium to form numerous structures resembling small bile ducts; chronic, frequently obliterating endophlebitis of centrilobular and hepatic veins; considerable variation in size and shape of parenchymal cells, many of which contain abnormally large, coarse and densely basophilic nuclei and diffuse fibrosis which disrupts lobular structure. Moderate, variable steatosis of parenchymal cells is hardly exceptional under the circumstances.

Allcroft, Carnaghan, Sargeant and O'Kelly (1961) noted the close similarity of Brazilian groundnut meal poisoning in ducklings and turkey poults to experimental seneciosis in chickens as described by Campbell (1956). In cattle the disease is indistinguishable from ragwort (*Senecio jacobaea*) poisoning, the commonest British example of seneciosis. Not only are the symptoms and the gross morbid anatomy the same, the tetrad of hepatic lesions (Markson, 1960) is essentially identical. Hill (1960) considered the veno-occlusive lesion to be a characteristic feature of seneciosis, while Bull (1954) has stated categorically that the hepatocellular abnormality, which he called "megalocytosis," is pathognomonic of poisoning by pyrrolizidine alkaloids. (By "seneciosis" we mean intoxication by pyrrolizidine alkaloids, which occur naturally in species of *Senecio, Crotalaria* and *Heliotropium*.) There was no evidence of ragwort having been eaten in any of the outbreaks and the evidence indicted groundnut meal as the cause of the disease. The similarity of the hepatic lesions in the calves to those produced experimentally in poultry (Allcroft, *et al.*) and pigs (Loosmore and Harding) supported this conclusion, while calf nuts from some of the outbreaks and Brazilian groundnut meal were shown to be similarly toxic for guinea-pigs. Experimental Brazilian groundnut meal poisoning in calves has been studied by colleagues in the Biochemistry Department at Weybridge (Allcroft and Lewis) and

we have not duplicated this work. There is now no doubt of the source of the poison; but Allcroft and her colleagues (*loc. cit.*) have demonstrated by chemical analysis that it is "neither a pyrrolizidine alkaloid, nor the *N*-oxide of such an alkaloid."

Calculations based on the information obtained in out outbreaks show that affected calves consumed from 40 to 85 lb. of the groundnut meal over periods varying from 6 to 16 weeks. Bearing in mind the variation in toxicity among batches of meal, the evidence suggests that the total dose of the toxic factor is more significant than the rate of consumption. As with poultry and pigs, the susceptibility of cattle appears to diminish with age.

The main purpose of this letter is to describe a new disease of cattle which general practitioners may expect to encounter. In the absence of information about diet and pasture, it is indistinguishable from ragwort poisoning.

Yours faithfully,
R. M. LOOSMORE.

Veterinary Investigation Centre,
Reading.

L. M. MARKSON.

Central Veterinary Laboratory,
Weybridge.

August 13th, 1961.

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The Dave Douglas Fund

Sir,—May I, through your columns, say a most heartfelt "thank you" to all those who contributed to the above-named fund. Words alone cannot express my gratitude, not only for the sum donated, but also for the multitude of letters and messages of sympathy received from graduates of the Liverpool Faculty of Veterinary Science.

Not wishing to single out individuals, I would like to thank especially the Veterinary Society and the staff of Liverpool University, the Lancashire Division of the B.V.A., Martins Bank Ltd. (who omitted to make bank charges on the fund), and last but not least all those other ex-students, some anonymous, who gave so generously the sum of £345 3s. 6d.

Yours faithfully,
(Mrs.) LILIAN DOUGLAS.

22 Weldon Street,
Liverpool, 4.
August 8th, 1961.

Profession and Commerce

Sir,—I have no connexion with the commercial organisation responsible for the staff advertisements quoted by Mr. Halpin (*Vet. Rec.* **73** (32). 790), but an affinity with the veterinary profession and an interest in its status and future.

Nevertheless, I suggest that it is clearly quite pointless to compare and contrast, out of context, the portions of the two advertisements cited, without relevant information as to requirements for the critical criteria of responsibility, age and experience (whether from the advertisements or from their authors); in this context the word "administration" quoted is probably significant.

It is, perhaps, a needless comment that conclusions drawn from uncontrolled experiments are rarely sound.

Yours faithfully,
C. A. E. BRIGGS.

Russell House,
Woodnesborough,
Sandwich,
Kent.
August 14th, 1961.

DISEASES OF ANIMALS ACT, 1950—GREAT BRITAIN

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period		Anthrax	Atrophic Rhinitis	Foot-and-Mouth	Fowl Pest	Sheep Scab	Swine Fever
1st to 15th July, 1961		9	—	—	28	—	46
Corresponding period in	1960	5	—	—	16	—	54
	1959	5	—	—	7	—	37
	1958	5	—	—	13	—	75
1st January to 15th July, 1961		118	—	102	679	—	644
Corresponding period in	1960	133	—	14	1,337	—	653
	1959	132	—	9	424	—	638
	1958	96	3	111	322	—	766

TUBERCULOSIS ORDER OF 1938

The number of bovine animals slaughtered under the Tuberculosis Order of 1938 during the period 1st April to 30th June 1961, was 6.

FOOT-AND-MOUTH DISEASE—FINAL FIGURES

The number of animals slaughtered as diseased or exposed to infection for the period 1st January to 31st March, 1961 was 23,310 and from 1st January to 30th June, 1961 24,787.